OSWER Innovations Pilot

Using Auto Shredder Residue as Cement Manufacturing Feedstock

The Office of Solid Waste and Emergency Response (OSWER) initiated a series of innovative pilots to test new ideas and strategies for environmental and public health protection. A small amount of money is set aside to fund creative proposals. The creative projects test approaches to waste minimization, energy recovery, recycling, land revitalization, and homeland security that may be replicated across various sectors, industries, communities, and regions. We hope these pilots will pave the way for programmatic and policy recommendations by demonstrating the environmental and economic benefits of creative, innovative approaches to the difficult environmental challenges we face today.

BACKGROUND

Metal recycling from automobiles, appliances, and scrap steel occurs at over 200 dedicated shredding operations nationwide. Automobile shredder residue (ASR) consists of glass, rubber, plastics, and textiles that remain after ferrous and nonferrous metals (primarily aluminum) have been removed. Over 4 million tons of ASR are generated in the U.S. each year, constituting about 1-2% of landfilled wastes. Recovery of specific materials from ASR is difficult due to the physical nature of ASR, contamination, weak markets for major recoverable materials (such as polyurethane foam, rubber, and glass), and the processing needed to meet market specifications. Attempts to upgrade ASR to meet market specifications for low-ash, low-sulfur fuel for blast furnaces and for secondary material recovery are expensive and result in a significant residual waste volume.

Use of ASR in cement kilns is easier to accomplish compared to most other industries because kilns can tolerate high ash fuels and heterogeneous materials without compromising cement quality or the environment. Considering the alternative feedstocks that kiln operators currently use and the volume of ASR generated each year, ASR has a strong potential to serve as both a fuel and mineral supplement.

PILOT APPROACH

The California Department of Toxic Substances Control (DTSC), in cooperation with University of California at Berkeley, and EPA's Office of Solid Waste, proposes to demonstrate ASR methods necessary to meet cement manufacturing feedstock requirements. The goal of this study is to identify the feedstock quality parameters and mechanical means necessary to process ASR into material appropriate for substitution of coal and mineral feedstocks.

DTSC will begin by conferring with kiln operators to scope the use of ASR streams and generate data on ASR characteristics, including physical parameters and fuel characteristics, as well as PCB and other contaminant levels. Using this data, DTSC will conduct field tests to mechanically separate and further delineate ASR wastes. Physical and chemical laboratory tests will determine the chemical, energy, mineral, and contaminant content of the processed streams and validate conformance with kiln specifications. Finally, DTSC will cost a full scale system for using ASR and compare this to coal and mineral feed as well as avoided landfill and treatment costs. EPA will work with DTSC to ensure any environmental issues are addressed including the collection of data on mercury, cadmium, lead, and PCBs.

INNOVATION

This pilot is innovative because ASR has not been tested as a mineral or energy feedstock at U.S. cement kilns before. ASR has been dismissed as a feedstock because of perceptions of low BTU and contamination, as well as the variability of the physical nature of the waste. The regulatory programs at DTSC and EPA and air pollution agencies will have needed information to evaluate the use of ASR by cement kilns.

BENEFITS

If environmentally and economically viable, separating ASR into high BTU and high mineral fractions for recovery in cement kilns could result in conservation of over 2 million tons of coal and minerals each year in the U.S. Finding alternatives to landfilling ASR could reduce landfill waste by over 4 million tons annually All generated ASR potentially could provide 8% of the cement industry energy needs as supplemental fuel. Substitution of ASR in kilns would also reduce the environmental impacts of mining and transporting coal and mineral ores. The potential impacts of landfill leachate contaminated with ASR constituents would also be avoided. The results of this project will be applicable to all regions of the country.

CONTACTS

Steve Souders, OSW, 703-308-8431

For additional information, visit the EPA OSWER Innovations web site at: www.epa.gov/oswer/iwg.

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